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10/539,513

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EXAMINER

TESKIN, FRED M

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1796

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/539,513 | Applicant(s) KOEHLER ET AL. | |
| | Examiner Fred M. Teskin | Art Unit 1713 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☒ Claim(s) 14, 19, 20 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>20050617</u> . | 6) <input type="checkbox"/> Other: ____. |

The preliminary amendment filed June 17, 2005 has been entered. Claims 1-20 are currently pending and under examination herein.

Regarding the information disclosure statement filed June 17, 2005, the listed documents assigned Cite Nos. 1-5 are in compliance with MPEP 609 and have been considered; those assigned Cite Nos. 6-10 have not been considered as copies of each of these foreign patent and non-patent literature documents are presently not of record. See 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed.

The disclosure is objected to because of the following informalities: (i) a brief description of the two views of the drawing has not been provided (see 37 CFR 1.74); (ii) at page 2, final sentence, the reference to "a process as characterised by Claims 1 to 14" is inconsistent with the present listing of claims, which includes process claims 1 to 15; and (iii) at page 19, line 18 and page 23, line 10, reference is made to "Figures 1-3" and "Figures 1 to 3", respectively, which is not understood as the original application papers include a single sheet of drawing labeled "Fig. 1". Clarification and appropriate correction are required.

Art Unit: 1796

Claim 14 is objected to because of the following informalities: the phrase "are ... components" (in line 4) should read --is ... component--, consistent with the single compound earlier recited. Appropriate correction is required.

Claim 19 is objected to because of the following informalities: in the recited concentration for $\chi_{\text{ethylidenenorbornene}}$, a hyphen has been omitted between "0.05" and "0.2" (see line 3 of the claim). Appropriate correction is required.

Claim 20 is objected to because of the following informalities: in line 3, ethylene/propene/ethylidenenorbornene ratio is expressed as "mol", whereas the same ratio is characterized as mol-% in the specification (*cf.*, page 12, lines 21-22). Clarification is required as to the correct concentration unit for this ratio.

Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. More specifically, the following grounds for indefiniteness apply to the indicated claims.

(A) The recitation of "characterized in that" in each of claims 1-15 creates indefiniteness as to the effective scope of the claims. It is unclear, for example, whether such language is intended to open or close the claims with respect to unspecified steps and materials. The use of definite transitional language such as "comprising" is suggested.

Art Unit: 1796

(B) Regarding claim 1, the provided definitions for variables m, n, o, p, q and r in formula (I) create uncertainty as to the scope of compounds intended to be covered. Note that, per the recited definitions, when $p = q = 2$, $r = -1$, which is untenable. And where $p = 2$ and $q = 1$ (or $p = 1$ and $q = 2$), $r (= 3 - p - q)$ becomes zero and formula (I) reads on organoaluminum compounds lacking any complex-bonded ligand - e.g., $(R^3)_2(R^2)Al$, which embraces simple trialkylaluminum cocatalysts. It is not seen wherein claim 1 requires the "intramolecularly Lewis-base stabilised" feature of applicants' organoaluminum compound as described herein (*cf.*, Specification page 4, ll. 10-11).

(C) Regarding claims 1, 3, 4 and 7, each recites a broad range or limitation together with a narrower range or limitation that falls within the broad range or limitation; e.g., "hetero atoms, such as N, P, O, S, F ..." (see the definition of R^1 in claim 1 and the recitation of hydrocarbons in claims 3-4 and of (cyclo)olefins and dienes in claim 7). A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c) and note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language.

(D) Regarding claims 16-20, the expression "copolymer ... *obtainable* by a process according to claim 1" renders the claims indefinite because almost any variation in any parameter within the scope of the claimed process would alter the copolymer produced. In consequence, one who made or used a polymer made by a process other

Art Unit: 1796

than the process recited in claim 1 would have to produce copolymers using all possible parameters within the scope of the claim – a practical impossibility – and then extensively analyze each product to determine if his product was obtainable by a process within the claimed process. A claim is indefinite if undue experimentation is involved to determine the boundaries of protection. *Ex parte Tanksley*, 26 USPQ2d 1389. This rationale is applicable to the present case in view of the extensive testing that would be involved in ascertaining whether a copolymer made by a process different to that claimed is nevertheless obtainable by the claimed process. Amending claims 16-20 by replacing “obtainable” with –obtained- would obviate this ground of rejection.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Kottenhahn (US 3154528).

Kottenhahn discloses a catalyst system obtained by mixing vanadium tetrachloride with selected organometallic compounds having a hetero-atom that is

Art Unit: 1796

separated by 3 or 4 carbon atoms from the metal, for (co)polymerization of hydrocarbon monomers (col. 1, ll. 10-14 and 40-45). The organometallic compounds are more specifically described as those which can undergo internal chelation by an oxygen, sulfur or nitrogen atom, which is postulated to involve coordination of the free coordination site of the metal with the O, S or N atom (col. 2, ll. 22-28). At column 1, lines 50-55, the organometallic compound of Kottenhahn is defined by a structure which depicts internal chelation of the hetero atom (X) to aluminum and which appears to correspond to the structure given for compound a) in applicants' Example 1 (*cf.*, Specification, p. 24). Kottenhahn further details preparation of (3-diethylaminopropyl)-diisobutylaluminum and (3-ethoxypropyl)diisobutylaluminum, see Examples 1 and 2, as well as their use in coordination catalysts with VCl_4 to prepare both copolymers of ethylene and propylene and terpolymers of ethylene, propylene and 1,4-hexadiene or 11-ethyl-1,11-tridecadiene, see Examples 1(C), 2(C), 3(A), 4, 5(A), 6-8 and 10(A). The Kottenhahn compounds, (3-diethylaminopropyl)-diisobutylaluminum and (3-ethoxypropyl)diisobutylaluminum, are species of compounds recited in present claim 11 and embraced by formula (I) in claim 1. Thus, claim 11 lists compounds including "[3-(diethylamino)propyl]dibutylaluminium" and "[3-(ethoxy)propyl]dibutylaluminium", and the term "butyl" in each, taken in the broadest context, embraces any and all isomers of $-\text{C}_4\text{H}_9$, including *iso*-butyl. As such, Kottenhahn is seen to describe specific species of compounds within claims 1 and 11 as components of a coordination catalyst system with a vanadium-containing mixed catalyst, for preparing co- or terpolymers of olefins within claims 7-9 by polymerization reactions within claims 2-6; e.g., solution

Art Unit: 1796

polymerization in trichloroethylene or slurry polymerization (a form of suspension) in methylene chloride reaction medium, under temperature/pressure conditions as per claim 5. Further as to polymerization conditions, attention is directed to column 8, lines 24-28; column 9, lines 70-74 and column 10, lines 5-9. Regarding claim 10, the limitation to specific olefins to be used for terpolymerization is not seen to exclude performing the preparation of co-polymers from olefins such as ethylene and propene, as described by Kottenhahn, in accordance with the alternative language of parent claim 1 ("preparation of co- or terpolymers from olefins"). As such, claims 1-11 are deemed to lack novelty.

Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kottenhahn.

Kottenhahn is applied as in the preceding rejection. Use of the specific compounds recited in claims 12-14 as components of a coordination catalyst system for the co- or terpolymerization of olefins is not specifically described therein. However, regarding the claimed use of "[3-(dimethylamino)propyl]dimethylaluminium" and "[3-(diethylamino)propyl]diethylaluminium", Kottenhahn teaches that results similar to those described in Examples 1-C, 2-C, 2-D, 2-E, 3-A, 3-F, 4, 5-A, 5-B, 6, 7, 8, 9-C and 10 are obtained when the respective organoaluminum compounds used in these examples are replaced by any one of seven named compounds, including (3-diethylaminopropyl)-diethyl aluminum (col. 18, ll. 15-30). Based on their close homologous relationship with (3-diethylaminopropyl)-diethyl aluminum, there would have been a reasonable

Art Unit: 1796

expectation of [3-(dimethylamino)propyl]dimethylaluminium and [3-(diethylamino)propyl]diethylaluminium likewise providing results similar to those described in Kottenhahn Examples 1-C, 2-C, 3-A, 4, 5-A, 6-8 and 10-A, each of which otherwise meets the positive limitations of claims 12-14. This is especially true in the case of [3-(dimethylamino)propyl]dimethylaluminium, since the very same compound is included in Kottenhahn's list of representative organometallic compounds (at col. 3, line 54). Given an expectation of equivalent performance, it would have been obvious to one of ordinary skill in the art at the time of applicants' invention to modify Kottenhahn by replacing the organometallic compound used in any of the above-cited examples thereof with [3-(dimethylamino)propyl]dimethylaluminium or [3-(diethylamino)propyl]diethylaluminium as per claims 12-14, and thereby arrive at the presently claimed subject matter.

Claims 16 and 17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kottenhahn.

Kottenhahn is applied as in the preceding rejection of claims 1-11. As there noted, Kottenhahn describes (Examples 1(C), 2(C), 3(A), 4) the preparation of ethylene/propylene copolymers using, as a component of a coordination catalyst with VCl_4 , specific species of organoaluminum compound embraced by formula (I) in claim 1. The cited examples each characterize the copolymers products in terms of weight percent propylene monomer units and inherent viscosity. The stated weight percentage of propylene monomer units in the obtained products (e.g., 78.5 wt% in 1(C) and 80

Art Unit: 1796

wt% in 2(C)) implies a molar ratio of ethylene to propene within the claimed range (i.e., 1:99 to 99:1, per claim 17). While inherent viscosity is reported, molecular weight is not directly disclosed; however, since present claim 1 (from which claims 16 and 17 depend) recites no process condition not disclosed by Kottenhahn, the presumption is that the copolymer produced per the cited examples is the same as, or patentably indistinguishable from the copolymer product of applicants' process. The identity of process conditions between claim 1 and Kottenhahn supports a *prima facie* case of unpatentability as to the claimed product as per *In re Spada*, 15 USPQ2d 1655 (Fed. Cir. 1990).

Claims 1-3 and 5-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Langer, Jr. (US 4224181).

Langer, Jr., teaches an improved Ziegler-type catalyst system for alpha-olefin type polymerizations. The described improvement (increase in polymerization activity while controlling polymer crystallinity (e.g., isotacticity) over a wide range) derives from adding an alkyl metal compound selected from R'_2YNR and $R'XYNR_2$ ($Y = Al, Ga, In$) to a catalyst system including a Group IV-VIII transition metal halide and an alkyl metal cocatalyst selected from R'_3Y or R'_2YX ($X = \text{halide}$) and mixtures thereof (col. 2, ll. 30-53). A method of ethylene-propylene copolymerization wherein diethyl aluminum diisopropylamide ($Et_2AlN(iPr)_2$) is added to a $TiCl_3-Et_2AlCl$ catalytic mixture is described by Langer, Jr., see Example IX together with column 7, lines 25-40.

Referring to general formula (I) in claim 1, it is apparent that the formula covers compounds of formula $R^2R^3_2Al$ (when $p = 2$ and $q = 1$), that R^2 and R^3 can independently be alkyl, Cl or X^2 , that X^2 can denote NRR' , and that R and R' can each be alkyl. The covered compounds thus include both of the organoaluminum compounds used as components of the Langer, Jr., catalyst composition in the ethylene-propylene copolymerization described therein; i.e., Et_2AlCl and $Et_2AlN(iPr)_2$. Further, applicants' support (C) is "optional[ly]", hence a non-essential feature of the claimed invention (though described in Example XI of Langer, Jr.). Regarding claims 2 and 3, note that, per Example IX, the ethylene-propylene copolymerization was carried out in a similar manner to the procedure of Example VIII, which references Example 1, Run A regarding polymerization procedure. According to Example I, the polymerization was carried out in n-heptane to a reaction temperature of $65^\circ C$ and at a pressure of 765 mm, to produce a reactor slurry (col. 7, ll. 25-36). Such a slurry polymerization is considered a form of "suspension" polymerization within claims 2, 3 and 5. Regarding claim 10, the limitation to specific olefins to be used for terpolymerization does not exclude the preparation of co-polymers from olefins such as ethylene and propylene, as described by Langer, Jr., in accordance with the alternative language of parent claim 1 ("preparation of co- or terpolymers from olefins"). As such, claims 1-3 and 5-10 are deemed to lack novelty.

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohler et al (US 2002/0173603).

Kohler et al disclose catalyst systems that can be used both for the polymerization of ethylene and of propylene and higher α -olefins (paragraph 29). The disclosed catalyst systems are characterized by aluminum alkyl complexes of defined formula (I), applied to magnesium chloride, SiO_2 or SiO_2 in combination with MgCl_2 , as support in the presence of titanium halides or vanadium halides, acting both as cocatalyst and as stereoselectivity promoters in heterogeneous polymerizations of α -olefins (paragraph 1). Extensive disclosure is provided regarding polymerization of ethylene and of propylene (propene), using catalyst systems consisting of specific aluminum alkyl complexes as cocatalyst together with TiCl_4 supported on MgCl_2 , see paragraphs 139-145 and 175-184. As detailed in paragraphs 147, 176, 178, 181 and 183-184, the specific aluminum alkyl complexes used in the polymerizations conform to general formula (I) in claim 1 and include species recited in claims 11-15. Polypropylene samples obtained with the disclosed catalyst system are characterized by molecular weights of $4 \cdot 10^5 - 1 \cdot 10^6$ g/mol (see paragraph 165 and cf., claim 16); however, a process for the preparation of co-polymers or terpolymers from olefins is not specifically disclosed by Kohler et al.

However, though not disclosed in a specific embodiment, the possibility of preparing co-polymers from olefins such as ethylene and propylene is plainly suggested by Kohler et al. Thus, in addition to presenting claims to a method comprising heterogeneous polymerization of "at least one α -olefin", wherein the at least one α -olefin includes "ethylene and propylene" (page 13, claims 2-3), Kohler et al teach that their novel catalyst systems "make it possible to prepare homopolymers, copolymers and

Art Unit: 1796

block copolymers, preferably the homopolymers polyethylene and polypropylene" (paragraph 161). The indicated preference for polyethylene and polypropylene homopolymers would not have taught away from the stated copolymers, as it is well settled that preferred embodiments do not constitute a teaching away from less preferred embodiments of a broader disclosure. *In re Boe*, 148 USPQ 507 (CCPA 1966); *Merck & Co. v. Biocraft Labs.*, 10 USPQ2d 1843 (Fed. Cir. 1989). Here, the broader disclosure (and claims) of Kohler et al would have suggested the described catalyst system could be used to prepare copolymers from olefins, and given the well known commercial applications of ethylene/propylene copolymers, one of ordinary skill in the art would have found it obvious at the time of applicants' invention to select those olefins for polymerization using the catalyst system of Kohler et al, motivated by a reasonable expectation of success in obtaining an ethylene-propene copolymer, as claimed.

No claims are in condition for allowance at this time.

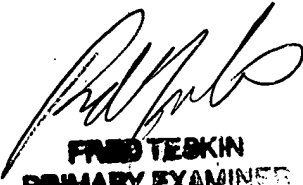
Any inquiry concerning this communication should be directed to Examiner F. M. Teskin whose telephone number is (571) 272-1116. The examiner can normally be reached on Monday through Thursday from 7:00 AM - 4:30 PM, and can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The appropriate fax phone

Art Unit: 1796

number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


FRED TESKIN
PRIMARY EXAMINER
1796

FMTeskin/12-27-07